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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/646,142

08/22/2003

Michael A. Risch

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08/01/2006

EXXONMOBIL CHEMICAL COMPANY

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EXAMINER

DANG, THUAN D

ART UNIT

PAPER NUMBER

1764

DATE MAILED: 08/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/646,142

Applicant(s)

RISCH ET AL.

Examiner

Thuan D. Dang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 24-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 24-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 24-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 24, the sequence of the steps are not clear. In steps (b) and (c), it is unclear if the olefinic stream in step (b) is the starting olefinic stream or the olefinic stream has been selectively hydrogenated. Similarly, it is unclear if the olefinic stream in step (c) is the starting olefinic stream or the olefinic stream has been selectively hydrogenated in step (a) and oligomerized in the step (b).

Also, regarding claim 24, step (c) requires oligomers formed in step (a) and (b) are separated. However, in step (a) oligomers are recited as an optional product.

The term "preferably" in claims 25, 26, 27, 28 should be removed.

The term "recovery section" of claim 29 lacks an antecedent basis.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 24, 25, 27, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marchionna et al. (US 2004/0010171 A1).

The Marchionna reference discloses a process for removing isobutene and butadiene from a C4 stream. The process comprises the selective hydrogenation of butadiene present in the stream and then sending the stream to a reaction zone in which the isobutene present in the stream is dimerized (i.e., oligomerized). The dimerized stream is then separated to recover linear butenes. The catalyst used in the selective hydrogenation step contains supported noble metals. The catalyst used in the dimerization step includes solid acids such as molecular sieves. See paragraphs [0019], [0020], [0036], [0038], [0064], and [0065].

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Marchionna does not disclose that oligomers produced in step of hydrogenation with the oligomers produced in the oligomerization step are separated from the olefinic stream (also see the above 112 rejection).

However, if oligomers are produced in the hydrogenation step of the reference process, It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the Marchionna process by removing both oligomers together if they have the same boiling point.

It is unclear if the reaction zones in the Marchionna process are contained in the same reactor or different reactors.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Marchionna by using either two separate reactors or one reactor containing both catalysts because the compounds to be converted will be converted equivalently in either case.

Claims 26 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marchionna et al. (US 2004/0010171 A1) in view of Polanek et al. (US 5,227,553).

As discussed above, it is unclear if the Marchionna reference discloses a porous inorganic oxide support for the hydrogenation catalyst. The reference also does not disclose the hydrogenation conditions as claimed.

The Polanek reference discloses the selective hydrogenation of butadiene. The process is conducted in the presence of a catalyst comprising a support such as alumina or silica and a metal such as platinum. Process conditions include temperatures ranging from 20° to 200° C and

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under pressures ranging from 5 to 50 bar and at a liquid hourly space velocity (LHSV) from 0.1 to 30 hr⁻¹. The amount of hydrogen added is equal to the stoichiometric amount or forms a hydrogen excess of up to 1.2 times the stoichiometric amount. See column 2, lines 50-55 and column 3, line 34 through column 4, line 31.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Marchionna by using the catalyst and conditions of Polanek in the selective hydrogenation step because such catalysts and conditions provide for the desired effect of selective hydrogenation.

Claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marchionna et al. (US 2004/0010171 A1) in view of Sakurada et al. (US 4,454,367).

As discussed above, the Marchionna reference does not disclose the specific molecular sieves used in the dimerization step and does not disclose the claimed conditions for the dimerization zone.

The Sakurada reference discloses the oligomerization of isobutene. The oligomerization is conducted in the presence of a mordenite catalyst at temperatures ranges from 20 to 180°C, pressures ranging from atmospheric to 100 kg/cm², and LHSV values ranging from 0.01 to 10 hr⁻¹. See column 2, lines 16-26 and 48-59 and column 5, lines 38-58.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Marchionna by using the molecular sieve catalyst and conditions of Sakurada in the dimerization step because such catalysts and conditions provide for the desired effect of dimerization.

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Response to Arguments

Applicant's arguments filed 5/30/06 have been fully considered but they are not persuasive.

The argument that the present claims require that butadiene are selectively reacted to form among other species, C5+ oligomers is not persuasive since C5+ oligomers are optional products (see claims). Further, these oligomers are also expected to be inherently produced since the Marchionna hydrogenation and the claimed hydrogenation are operated in the presence of the same feed stock.

The argument that in the reference's step (d), dimerized isobutene is separated from the non-reactants in the stream and not co joined therewith the species are all sent in a single stream to the next step is not persuasive since the hydrogenated olefinic stream in the reference is also passed to the oligomerization step before it is separated. This sequence is similar to the sequence used in the claimed process.

The argument that there is no step in the reference that fairly suggests step (c) of the present claims is not persuasive as discussed in the above rejection.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after

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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

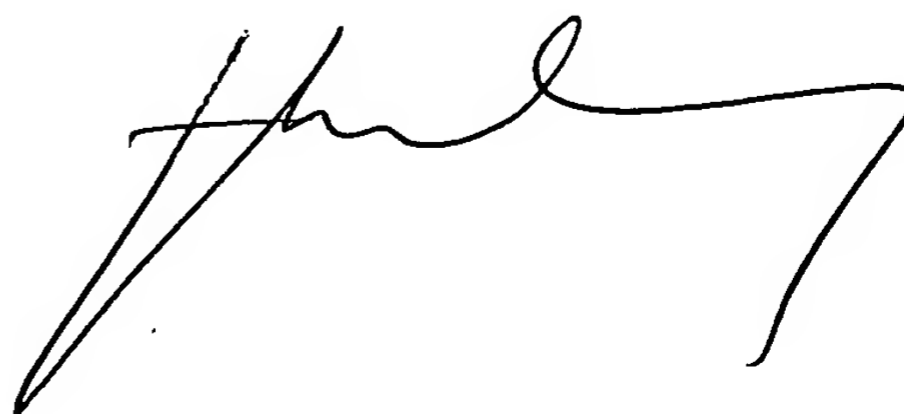
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thuan D. Dang whose telephone number is 571-272-1445. The examiner can normally be reached on Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Thuan D. Dang
Primary Examiner
Art Unit 1764

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A handwritten signature in black ink, appearing to be 'Thuan D. Dang', written over a horizontal line.